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Blister Pack

5 This invention concerns a blister pack, containing a base part with one or more recesses surrounded by a shoulder, where the shoulders in total form a coherent flat shoulder surface, and a cover film covering at least the recesses or recess openings, and the recesses containing contents which can be removed from the recess. The invention also consists of the use of the blister pack and a process for its production.

10 It is known to seal base parts, also known as content carriers, of blister packs, also known as push-through packs, with push-through cover films, for example made from a metal such as aluminium. The cover film can be an aluminium foil coated with a sealant, such as a sealing lacquer. The aluminium foil is sealed onto the base part with this sealant. To remove the contents, these are pushed against
15 the cover film by deforming the recess, causing the cover film to tear or burst, thereby releasing the content or filling. This means that the cover film must be inelastic and easily tearable. Thus aluminium foils modified with a sealing layer are especially suitable for this purpose. The packs described contain for example medicaments such as pills, tablets, dragees, ampoules and the like.

20 The contents, in particular medicaments, in their habitually colourful forms of administration which resemble sweets, arouse the curiosity of children. In order to prevent children from gaining access to special medicaments, it is often appropriate to make their opening manipulation difficult. Said cover films have the disadvantage that the intended ease with which they may be pushed through constitutes a not insurmountable obstacle, even for children, to the removal of the contents from the packaging.

30 A child-safe pharmaceutical packaging comprising a base foil, a push-through foil and a safety foil is known from DE-A-29 19 713. The content cannot be removed from the pack by pushing it through without first completely removing the safety foil, for example by peeling it off, which can however be difficult even for adults, in particular elderly persons.

35 The purpose of this invention is to create a blister pack that cannot be opened by children but which can still be easily used and opened by adults, notably the elderly.

In accordance with this invention, this task is solved in that the shoulder surfaces on the base part of the pack has at least one opening aid with at least one effective opening edge or point, which can weaken the cover film overlies the recess opening so that the contents can be pressed out of the recess.

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The opening aid can be preferably at least partly detached or released from the shoulder surface, whereby it is advantageous for the opening aid to consist of one or more surface parts which are separated by one or more weakening lines, and which can be detached from the shoulder surface along the weakening lines by

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hand or with aid.

The blister pack in accordance with this invention suitably contains a base part with at least one or more square, round or oval recesses, which are also known as compartments or cups. The base part can, for example, be rectangular from

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the top view, whereby the recesses are preferably evenly distributed and arranged in lines and rows or placed mutually offset.

Weakening lines are target separation lines or target separation areas along which the material can be separated, preferably manually. The weakening lines

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are produced for example using mechanical means, such as cutting, stamping or scratching with knives, using physical means such as for example heat treatment, laser beaming, electron beaming, electrical discharge machining, dissolution, or swelling using solvents or through chemical reaction, e.g. by etching. The weakening lines can accordingly be areas in a foil which are completely or partially separated or are weakened through a change in the structure of the material and through abrasion of the material.

The base parts of this blister pack can be embossed, cast, deep- or stretch-drawn or vacuum-moulded base parts made of metal such as aluminium, plastic, plastic/paper composites such as plastic/paper composites or plastic/metal composites. The plastics may be plastics coated with inorganic layers, in particular with SiO_x .

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Suitable plastics for base parts are for example thermoplastics containing foils and foil composites on an olefin basis, such as polyethylene, polypropylene or copolymers thereof, on an ester basis, such as polyethylene terephthalates, polyamides or halogen-containing plastics such as polyvinyl chloride or polyvinylidene chloride or mixtures thereof. The base parts may also have a barrier layer against

gases and vapours. Such a barrier layer may for example be a metal foil, such as an aluminium foil embedded in a plastic composite or a ceramic or metal layer arranged between two plastic layers. Ceramic or metal layers may for example be produced by vaporising metals, oxides or nitrides of aluminium, silicon and other metals and metalloids in a vacuum and depositing the materials on a plastic carrier.

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The base part may also be manufactured from or using materials containing cellulose, such as paper, board, card, moulding materials containing paper, or be reinforced with the aid of such materials.

In a preferred embodiment, the base part consists of or contains polyvinylchloride (PVC), PVC coated with polyvinylidene chloride (PVdC), cyclo-olefin copolymer (COC) or polychloro-trifluoroethylene (PCTFE). Composite foils with PCTFE, in particular with PCTFE and PVC, are also preferred. The total thickness of the base part is for example 100-500 mm, in particular 200-360 mm.

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Further preferred foil composites for base parts contain or consist of an external foil made of PVC of a thickness of 60-100 mm, a further external foil made of oriented polyamide (oPA) of a thickness of 25-30 mm and an intermediate foil made of aluminium of a thickness of 45-60 mm. In addition foil composites, each with an external foil made of polypropylene and an intermediate foil made of aluminium, may be used.

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Suitably, it is very difficult or impossible to press through the cover film by hand. The cover film can be manufactured for example from an aluminium foil, in particular an aluminium finished with a sealing coating, or from an aluminium foil composite. The cover film can also contain plastics and/or cellulose-like material, such as cardboard or paper. In particular, any plastic detailed above in the base part description, can be used. In the case of cover films from a plastic-metal composite, the metal coating can be fused or vapour-deposited in the form of a foil.

In addition, notably for single product packs, cover films can also be used that are made from plastics, in particular polypropylene, without metal foils or coatings, which can be pierced, cut or weakened with the corresponding opening aids described below. The plastics can for example contain fillers to reduce strength and to ease opening. The cover film can also be weakened, for example in the area of the recess opening, or have weakening lines, whereby for example the opening

process is facilitated by use of the opening aids. However, the weakening lines are suitably formed such that the contents cannot be extracted by hand without the help of opening aids.

5 The cover film can consist of, for example, an aluminium foil coated with a hot sealing lacquer between 8-50 mm thick, in particular 20-45 mm, preferably 37-43 mm.

10 Furthermore, the cover film can also contain an aluminium foil coated with hot sealing lacquer and 20-50 mm thick, in particular 20-30 mm, preferably 20-25 mm, onto which an external PET (polyethylene terephthalate) foil is laminated measuring 10-30 mm thick, in particular 12-20 mm. In another variant, said cover film can include a further paper layer on the plastic foil.

15 The cover film covers the base part, for example either partly or completely, and seals at least the recess openings. It is suitably connected to the surface with adhesive or seals. The sealing coating can for example contain or be made of polyolefins such as polyethylene, polypropylene or polyester, such as polyethylene terephthalate or polyethylene-2, 6-naphthalate and take the form of foils or lacquers and can for example have a thickness in the region of 1 to 50 mm. Correspondingly, hot sealing lacquer can also be used. Adhesives such as phenol resins, epoxy resins, cyanacrylates, acrylates, modified acrylates and in particular adhesive on a polyurethane base can be used.

25 The cover film suitably resists the customary pressure needed to remove the contents from the recess, in particular any pressure of which children are capable. The resistance of the top coating can be due to its strength and/or resilience.

30 The opening aids are or contain surface parts which suitably protrude from the shoulder area of the blister pack or which can be detached from the shoulder area along the weakening lines. Furthermore, fold lines can be provided, along which the surface parts can be bent. The opening aids and associated surface parts have advantageously effective opening edges and/or points, which can be brought onto the surface areas of the cover film to be opened.

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Fold lines are suitably designed in such a way that parts can be bent or completely removed at these. They are not separating lines, so it is impossible or very difficult to detach the parts along a fold line by hand.

As an example, a long point can be provided which can be pressed and detached from the base part along the weakening lines, e.g. perforated lines, and can be bent into shape so that the tip makes contact with the surface area of the cover film to be opened.

It can also be provided that the opening aids are completely detached or removed from the base part along the weakening lines.

10 In a further and preferred design variant, a surface element, suitably without a recess, can be provided next to a recess in the shoulder surface of the blister pack. This surface element should not be confused with the surface part described above as an opening aid. The surface element is delimited from the rest of the base part by way of one or more weakening lines and by at least one fold line
15 in such a way so that the surface element is separated from the base part along the weakening line and can be placed over the neighbouring recess opening by folding it down along the fold line. The fold line is preferably arranged between the surface element and the recess.

20 The swivellable surface element suitably contains an opening aid, for example as previously described, which can be used if the surface element is swivelled directly over the cover film covering the recess opening, so that the opening aid can be placed directly on the cover film.

25 The surface elements can be bent along the fold line. The fold line should in particular ensure sufficient connection between the surface element and the rest of the blister pack after several folds. The fold line is suitably shaped in such a way so that the surface element can be swivelled in both directions, for example clockwise and anti-clockwise.

30 The recesses in a blister pack can be arranged for example in lines and rows, preferably in two lines. For example a line of surface elements, each containing an opening aid, is assigned to each line of recesses. The line of surface elements is connected to a line of recesses by way of a fold line. The individual surface
35 elements are otherwise separated from each other or from the bordering shoulder areas of the recesses by weakening lines.

In a further design variant, the recesses in a blister pack can be arranged mutually

offset whereby the surface elements with opening aids, also mutually offset, are each arranged between at least two recesses. This optimises the existing surface of the base part and saves packaging, as the surface elements with opening aids occupy less space for example than the recesses surrounded by shoulders.

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In a particularly preferential design variant, the opening aids are designed in the form of individual or a multiplicity of teeth, preferably in the form of points or teeth. The points or teeth and the triangle shapes defined by the weakening lines in the blister pack are suitably circular, and are arranged with the tips of the points or
10 teeth preferably at a common point on the base part, so that a circular or polygonal tip of the tooth or point is formed when the point or tooth is pushed out from the base part. The weakening lines in the base part are for example star-shaped and arranged to cross at a common point, whereby two neighbouring tips of weakening lines can be connected by a fold line, so that the tooth or point along
15 this fold line can be better folded up from the plane.

The opening aid in the shape of a crown is preferably provided in a surface element of the type described above. The distance from the midpoint of the recess opening to the fold line between surface elements and the shoulder bordering the
20 recess preferably corresponds to the distance from the midpoint described by the circular or polygonal crown to the fold line, so that upon folding back the surface element, the crown in its concentrated position comes to rest on the recess or recess opening. The diameter of the crown enclosed by teeth or points is suitably less than, or suitably the same as, the diameter of the recess opening.

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By folding the surface element on the convex side of the recess (side on which the recess protrudes), the teeth or points can be folded out from the plane of the surface element by pressing the recess through with the opening aid, and brought into an effective opening position which is perpendicular or almost perpendicular
30 to the surface element. The teeth or teeth can however also be pushed up from the plane to the effective opening position by means of a finger or other aid.

To expose the contents of the pack, the surface element with the protruding teeth or points is placed on the concave side of the recess (side on which the recess is
35 hollowed out), i.e. on the recess opening. The teeth or points bore into the cover film, cutting a circular shape over the recess opening to damage or weaken this to an extent that the contents can then be pressed out of the recess by hand.

Further design variants similar to those described above can also be provided, whereby for example surface parts with effective opening edges or one or more teeth or points can be designed as an opening aid in place of a toothed crown.

5 It can also be provided that the surface elements of the opening aid, once detached from the base part, can be folded against themselves to form a stable opening tool, preferably a point. In addition, an opening aid detached from one of the weakening lines in the form of a semi-circle can be used as a semi-circular cutting tool.

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A particular design variant shows a blister pack with an opening aid arranged on the shoulder area of the blister pack or at its edge, and which is suitably surrounded by weakening lines and which can advantageously be at least partly detached from the shoulder area, whereby the detached part of the opening aid has at least one effective opening edge, such as a cutting edge, point or tooth. The effective opening edge or point is preferably directed away from the recess opening. On the edge of the blister pack facing the opening aid, advantageously a roll-up element is provided and connected to the edge section e.g. by a seal or adhesive. To open the recess opening, the shoulder area is rolled back with the aid of the roll-up element, where the cover film suitably lies on the inside when rolled up. As soon as the roll-up element starts to roll up the surface area of the opening aid, this is detached from the shoulder area due to the resulting bending stresses along the weakening lines and preferably protrudes at a tangent from the rolled shoulder area. As rolling of the shoulder area continues, the protruding opening aid will be rolled up with the shoulder area around the roll-up element and its effective opening edge or point, preferably vertical, makes contact with the cover film, whereby the distances between the opening aid and the recess, as well as between the opening aid and the edge and roll-up element, are selected so that the opening edge or point penetrates or weakens sections of the cover film preferably in the edge area of the recess opening so that the contents of the pack can be pushed out of the recess. The weakening of the cover film suitably acts as a tear notch, along which the cover film will start to tear when a perpendicular pressure is exerted on it, thereby exposing the contents. The weakening lines can be designed as described above.

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The outside of the push-through pack bears markings and graphic elements at corresponding points, informing the consumer inter alia of the individual opening procedures.

A blister pack in accordance with the invention can be produced in that recesses can be formed from a flat composite foil and the recess can be filled with contents and a cover film can be sealed to the composite foil over the recess openings of the recesses and fold lines and/or weakening lines of the opening aid can be arranged in the composite foil with cover film, and blister packs with one or more recesses can be cut out.

In addition, in the case of blister packs with several recesses, the fold lines and/or weakening lines of the surface elements can be applied before the pack is cut to size.

If the blister pack includes roll-up elements, these can be sealed or glued at the same time as the cover film is sealed to the manufactured blister pack, preferably on the designated edge of the blister pack.

The contents of the pack according to the present invention can only be removed after performance of a regulated sequence of opening hand movements, i.e. pressed out from the recess through the cover film. This is an almost impossible task for children, they can scarcely perform several simultaneous movements in succession. In particular, the pressing through of the opening aid from the base part and the use of the opening aid to damage the cover film cannot be executed by children intuitively, but requires prior knowledge or the ability to read the packaging information. However, elderly people will find the packaging very easy to open.

A more detailed explanation of the invention is given below with reference to the enclosed diagrams. These show:

- 30 Fig.1a-d: a diagrammatic view of the opening steps to expose the contents of a blister pack with a recess;
- Fig.2a-c: a diagrammatic view of various opening aids;
- Fig. 3: a diagrammatic view of a blister pack with several recesses and opening aids containing foldable surface elements;
- 35 Fig.4: a diagrammatic view of a further blister pack with opening aids;
- Fig.5: a top view of a blister pack with mutually offset recesses and surface elements with opening aids;
- Fig.6a-b: a top view of a blister pack before and after the application of open-

ing aids;

Fig.7a-b: a perspective view of the opening process of a blister pack with a further opening aid.

5 The blister pack 1 shown in Fig. 1a-d contains a base part 2 with a recess 3 and a surface element 6 bordered by a fold line 7, which has an opening aid 9 defined by a weakening line 8'. The weakening lines 8' are in the shape of a star and arranged to cross at a common point. Between the neighbouring ends of two weakening lines 8' run fold lines 7', which facilitate the unfolding of the teeth (Fig. 1a).

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The surface element 6 with the opening aid 9 is folded on the convex side of the recess (Fig. 1b) and the recess 3 is pressed by means of the opening aid 9 so that the surface parts 10 in the shape of teeth are pressed out vertically from the plane of the surface element 6 to form a crown (Fig. 1c).

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The surface element 6 is then folded back again and swivelled around with the tooth points in front to the concave side of the recess 3 (Fig. 1d). The surface parts or teeth 10 of the opening aid 9 bore into the cover film 5 over the recess opening 4 and weaken or damage the cover film 5 in such a way that the contents

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Fig. 2a shows an enlarged opening aid 9 with surface parts or teeth 10 in the shape of a crown in perspective. The surface parts or teeth 10 are folded up along the fold lines 7' from the shoulder area of the blister pack or from the surface elements.

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The opening aid 9' shown in Fig. 2b lies on a surface element 6 of a blister pack 1' and has a semi-circular cutting edge. The opening aid 9' or its associated surface part is detached from the surface element 6 along a semi-circular weakening line 8'. This can take place e.g. through folding the surface element 6 along the fold line 7 on the convex side of the base part 2, whereby the recess 3 is pressed out on complete folding of the opening aid 9'. By bending the surface element 6 along the fold line 7 on the concave side of the base part 2, the cover film 5 in the area of the recess opening 4 can be separated or weakened with the semi-circular cutting edge of the opening aid 9'.

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The variant of an opening aid 9''' shown in Fig. 2c in top view, arranged on a surface element 6 is distinguished in that this can be detached from a blister pack 1''

along a weakening line 8', and the surface part of the opening aid 9''' can be shaped into a stable point by folding it over onto itself.

5 The opening aid 9''' suitably has two edges running opposite each another preferably in the direction of the recess opening to a point or tooth 18. Fold lines 7', one of which ends in the said tip 18, are arranged in the opening aid 9''' and in the associated surface part. The fold lines 7' border two wing parts 17, 17'. The wing parts 17, 17' can be folded against each other along fold lines 7' after being detached along the weakening lines 8', whereby the wing parts 17, 17' make contact
10 with another in particular at the tip 18 to form a stable fixed point. The opening aid 9''' is detached in the same way as described in Fig. 1 and 2b.

Fig. 3 shows a section of a blister pack 11 with several recesses 3 and surface elements 6, containing opening aids 9 with weakening and fold lines 8', 7' in the
15 shape of toothed crowns. The surface elements 6 are mutually delimited by weakening lines 8. The surface elements 6 are also delimited from the recesses 3 by fold lines 7. The surface elements 6 with the opening aids 9 can be removed along the weakening lines 8 from the blister pack 11 and can be folded over along the fold line 7 onto the recess 3 or recess opening. The opening process is similar
20 to that described in Fig. 1.

Fig. 4 shows a blister pack 11' with triangular opening aids 9'' in the shape of triangular points, which are arranged in the shoulder area of the blister pack 11'. An opening aid 9'' is assigned to each recess 3. The opening aid 9'' can be removed
25 from the base part along the weakening line 8' and bent along the fold line 7' and its effective opening points applied to the cover film.

Fig. 5. shows a blister pack 12 with recesses 3 and surface elements 6 with opening aids 9 arranged offset and opposite each other, thereby saving space and packaging material. The surface elements 6 are separated from the recesses
30 3 by weakening lines 8 and merely connected to their opposite assigned recesses 3 by a fold line 7. The opening process is similar to that described in Fig. 1, 2b and 3.

35 Fig. 6a shows a blister pack 13' with recesses 3, after the recess openings have been filled with contents and sealed with a cover film. After this process and preferably before cutting into a packing unit, the opening aids 9, i.e. the associated weakening lines 8', are applied e.g. by punching, together with fold lines 7'. In ad-

dition, the weakening and fold lines 7,8 of the surface element 6 are also applied. After this process a finished blister pack 13' results (Fig. 6b).

5 The opening aids shown in Fig. 3 to 6 can also comprise a single tooth or point, or another shape as described above.

10 A further design form has a blister pack 15 with an opening aid 9''' in the form of a tooth or point, the form of which is outlined by weakening lines 8' applied to the shoulder area 18 (Fig. 7a-b). The teeth or points of the opening aid 9''' are directed away from the recess opening 4. At the edge 19 facing the opening aid 9''' of the blister pack 15 is arranged roll-up element 16. The roll-up element 16 is tubular and made from plastic and has a linear slot on its side to hold the edge area of the shoulder surface 18.

15 To open the recess opening 4, the shoulder area 18 is rolled back from the edge 19 with the aid of the roll-up element 16, whereby the cover film 5 lies on the inside. As soon as the roll-up element 16 starts to roll back the surface part of the opening aid 9''', this is detached from the shoulder area 18 along the weakening line 8' and projects mainly tangentially. As rolling of the shoulder area 18 and the opening aid 9''' continues, the protruding point will make contact with the cover film 5 along the edge and penetrate this. A local weakening or cut 17 is inflicted on the cover film 5 in the area of the recess opening 4, which serves as a tear aid. The contents can then be pressed out from the recess by hand.

25 In the top view, the blister pack 15 can for example take the shape of a polygon, in particular a triangle, preferably an isosceles triangle or the shape of a trapezium, preferably an isosceles trapezium. The blister pack 15 preferably tapers starting from the roll-up element 16 in the direction of the recess opening 4.

30 The blister pack can also contain several recesses, preferably arranged in a line, whereby each recess is assigned to a surface element in the blister pack. The surface elements are as described above preferably in the shape of an isosceles triangle or trapezium, and arranged mutually opposite and separable next to each other. The separating lines can be e.g. weakening lines applied to a blister pack.